Summer 2014 Undergraduate Research Programs at the University of Missouri for Non-MU Students

Animal Sciences - open application
Biochemistry – open application
Signaling in Cell Biology & Development - limited application (pending funding)
Cell & Molecular Biology - open application

Other Programs (see last page)
Undergraduate Bioinformatics Institute – May 19 - 30, 2014
Medical Sciences
Computational Neurosciences – (pending funding)
Biomaterials & Condensed Matter (Physics) – (pending funding)
Biocomplexity and High Performance Computing – (pending funding)

General Information: The Office of Undergraduate Research at the University of Missouri (MU) coordinates a number of summer research programs for undergraduates enrolled at other institutions. All programs run for 9 weeks (Wednesday, May 28 - Friday, July 25), with travel days being Tuesday, May 27 and Saturday, July 26. Students selected for these programs live in on-campus, air-conditioned housing (double rooms), and receive a meal plan, covered by the program. Summer interns also receive one hour of academic/research credit, travel to and from Columbia, and a stipend of $3600.

Funds are available for approximately 15 non-MU students in different programs (described on the following pages). An additional 50+ undergraduates from MU or in other programs will participate in all research and educational programming activities, creating a vibrant community of undergraduate researchers. Students will work on their own research project under the guidance of an MU faculty mentor and present their results at a poster Forum at the end of the summer (July 24th). Students become part of a research team that typically includes other undergraduate students, graduate students, lab technicians, and post-doctoral researchers. With 1,000 faculty members, over fifteen academic departments, and eight interdisciplinary programs and centers (all focused on the life sciences), MU is a great place for undergraduates preparing for a challenging career in biomedical and life sciences research and education! Our Columbia campus includes schools and colleges of Arts & Science; Agriculture, Food & Natural Resources; Engineering; Health Professions; Medicine; and Veterinary Medicine -- all within walking distance! MU is home to the nation's largest (10MW) nuclear reactor found on a college campus. The MU Research Reactor (MURR) provides advanced research opportunities for students and faculty in the neutron-related sciences and engineering and is an excellent facility for radiochemistry research.

Summer program alumni have entered graduate programs at California-Irvine, California-San Diego, Chicago, Colorado, Indiana, Iowa State, Michigan, Missouri, Purdue, Virginia, Washington University (St. Louis), and Wisconsin.

The Campus and Community: MU, the flagship campus of the University of Missouri system, is home to more than 34,700 students (7,700 in graduate and professional programs) and 2900 faculty. Columbia, midway between St. Louis and Kansas City, is a vibrant community with a population of more than 113,000. Columbia offers most of the benefits of large cities
(restaurants, art, theater, music, and a variety of churches) and yet maintains the atmosphere and convenience of a small, diverse college town. There are numerous trails for walking, running, and biking, and a variety of city and state parks nearby.

**Eligibility:** Applicants are expected to have completed at least one year of full-time college enrollment prior to June 2014 and be pursuing a major in animal sciences, biology, biochemistry, chemistry, plant sciences, computer sciences, or related fields. Students graduating prior to December 2014 are not eligible. **Students must be citizens or permanent residents of the U.S.** Please see the information on the individual programs for additional eligibility information.

**Application Information:** The deadline for applying to these programs is **Saturday, February 15, 2014.** Students must complete the attached application form and provide an unofficial transcript (including fall 2013 grades); at least one letter of recommendation (two preferred); a personal statement including career plans, prior research experience (if any), and statement of research interests; and a resume. Students attending one of the MU Summer Partner Schools (Barry, Fort Valley State, Grinnell, Long Island-Brooklyn Campus, Medgar Evers, Missouri State, CSU Monterey Bay, Prairie View A&M, and Truman State) should discuss their interest with their faculty contact at their home institution and submit their application through their faculty contact well in advance of February 15th. Completed application packets should be sent to Pam Cooper, Office of Undergraduate Research, 150 Christopher S. Bond Life Sciences Center, University of Missouri, Columbia, MO 65211. FAX: 573-884-9395. Questions can be directed to Pam Cooper (CooperPJ@missouri.edu, 573-882-5979) or Director Dr. Linda Blockus (BlockusL@missouri.edu).

**Educational Programming:** In addition to their research work, students participate in a full series of evening workshops and brown bag lunches designed to provide them with information about research, career preparation and options, and scientific ethics. Speakers have included MU faculty, a scientist from the Stowers Medical Institute, a scientist from Pioneer Seed, a veterinary oncologist, members of the National Academy of Science, clinical oncology researchers, science teachers, directors of graduate programs, and other scientists. Weekly specialty discussions provide opportunities for students to read articles relevant to the topics and engage in discussion with peers and faculty members. These specialty discussions are open to all students, regardless of program affiliation. A presentation on writing abstracts and designing posters is held in preparation for the poster Forum. Social activities also provide opportunities for participants to get to know each other and other members of the MU science community. A mandatory orientation session that includes team-building activities is scheduled for Wednesday, May 28th.

**Faculty Mentors:** Students are encouraged to read about the research interests of potential faculty mentors on the appropriate MU web sites. Students may find information on each of the faculty mentors listed below by accessing their departments’ web sites. Students should list up to 8 faculty that they are interested in working with on their application, regardless of which programs they are applying to. Please note that there is overlap in programs for many of our faculty mentors. Students should check to ensure that faculty mentors they list are participating in the program(s) for which they are applying.

**Website:** undergradresearch.missouri.edu
Miller Summer Research Internships in Animal Sciences

The objective of the Miller Summer Research Internship program is to introduce students to animal sciences research, emphasizing food and fiber producing animals. Animal Sciences faculty research a variety of areas, including: ruminant and nonruminant nutrition; reproductive physiology; genetics and molecular biology; environmental physiology; and production and management. Each student will be working directly within a laboratory under the supervision of an internationally recognized researcher. The participant will gain an understanding of recent advances in basic science and applied animal sciences research.

Eligibility Requirements:
~ Applicants must meet the basic eligibility requirements.
~ Students are expected to have a minimum of a 3.0 gpa and have completed 2 years of college.
~ Selection is partially based on the applicant’s potential and motivation for future graduate study (PhD level) in animal sciences.

Division of Animal Sciences Potential Faculty Mentors: (animalsciences.missouri.edu)

- Gavin Conant, Bioinformatics
- Christine Elsik, Computational genomics
- Jeffre D. Firman, Poultry physiology and nutrition
- Kevin L. Fritsche, Lipid nutrition, immunology.
- Rodney D. Geisert, Reproductive physiology-swine
- Jonathan Green, Molecular biology
- Duane Keisler, Reproductive physiology
- Monty S. Kerley, Ruminant nutrition
- William R. Lamerson, Animal breeding and genetics
- David Ledoux, Mineral metabolism
- Carol Lorenzen, Meat science
- Dennis Lubahn, Nutritional aspects of estrogen and hedgehog signaling in reproduction and cancer
- Mathew Lucy, Molecular endocrinology
- Tom McFadden, Lactational physiology
- Allison Meyer, Ruminant nutrition
- David Patterson, Extension beef cattle reproduction
- Randall Prather, Reproductive physiology/molecular biology
- Rocio Rivera, Animal molecular and cell biology
- R. Michael Roberts, Molecular biochemistry
- Tim Safranski, Extension-swine breeding and genetics
- Robert Schnabel, Genetics
- Justin Sexten, Ruminant nutrition
- Marcia Carlson Shannon, Extension-swine nutrition
- Michael Smith, Reproductive physiology
- Don Spiers, Environmental physiology
- Peter Sutovsky, Molecular/cell/development biology
- Jeremy Taylor, Genomics
- Kathy Sharpe Timms, Infertility and endometriosis
- Kevin Wells, Genetics
- Byron Wiegand, Meat science

Please visit the department website (animalsciences.missouri.edu) for detailed research descriptions before completing your application form.

Summer Research in Biochemistry

Biochemistry at Missouri is noted for interdisciplinary research and effective instruction. The two are interwoven to provide excellence in both. Even our name spans biology and chemistry. In the same spirit, the Department spans many other interfaces. For instance, we are part of both the School of Medicine and the College of Agriculture, Food and Natural Resources, and share faculty with more than five other departments as well as with the interdisciplinary Bond Life Sciences Center.

Our faculty members are internationally known researchers and prize-winning teachers, including two members of the National Academy of Sciences and multiple members of disciplinary academies and honorary organizations. More than thirty faculty conduct research in Gene Expression; Molecular Medicine; Plant Sciences; Receptors and Signaling; Macromolecular Synthesis, Assembly and Localization; Structural and Chemical Biology; Proteomics, Genomics and Combinatorial Chemistry; Enzymology, Nutrition and Metabolism.

The Biochemistry Summer Research Program seeks undergraduates from other institutions who are interested in exploring graduate education opportunities in Biochemistry at MU while conducting full-time research with an MU Biochemistry faculty member.

Eligibility Requirements:
~ Applicants must meet basic eligibility requirements.
~ Students must be planning on pursuing a PhD in Biochemistry.
~ Students are expected to have completed two years of college (including two semesters of organic chemistry) and have earned a minimum of a 3.0 gpa.

Please visit the department website for a list of faculty members and their research areas before completing your application form: (biochem.missouri.edu)
The MU Life Sciences Fellows Program (http://lifescigradprograms.missouri.edu/) is actively seeking to diversify their graduate program application pool. As part of this effort, we are offering four summer research positions for undergraduates in 2014. Preference will be given to students interested in applying to PhD programs in the life sciences at the University of Missouri after completion of their undergraduate degree. Applicants are expected to have completed at least one year of full-time college enrollment prior to June 2014, be pursuing a major in biology, biochemistry, microbiology, or related fields, and be a citizen or permanent resident of the U.S.

Summer research interns selected for this program will conduct cell & molecular biology research with faculty mentors who are members of the NIGMS Training Grant at MU. A list of eligible faculty mentors appears below. Additional questions may be directed to Pam Cooper (CooperPJ@missouri.edu, 573-882-5979) or Dr. Mark Hannink (HanninkM@missouri.edu).

**FACULTY MENTOR LIST** - please see departmental websites for information on research interests

**Department of Biochemistry** (www.biochem.missouri.edu)
- Peter Cornish – Single molecule analysis of ribosome function
- Mark Hannink - Mitochondrial movement and oxidative stress
- Dennis Lubahn - Botanical prevention of prostate cancer
- Scott Peck – Phosphoproteomics of plant signaling
- Brenda Peculis - Regulation of RNA stability
- Mick Patris – Trafficking and utilization of copper
- Charlotte Phillips - Mutant collagen molecules and bone diseases
- Gary Stacey - Functional genomics of plant development
- Jay Thelan - Proteomic analysis of seed development
- Steve Van Doren – Protein structure determination using NMR
- Judy Wall – Environmental microbiology
- Gary Weisman – Purinergic receptors and human disease

**Division of Biological Sciences** (www.biology.missouri.edu)
- Stephen Alexander – Molecular genetics of D. discoideum
- James Birchler - Structure and function of chromosomes
- Anand Chandrasekhar – Developmental biology of zebrafish
- Dawn Cornelison – Stem cells of muscle
- Michael Garcia – Molecular biology of neurofilaments
- Mannie Liscum – Phototropism and plant development
- Kathy Newton - Mitochondrial genetics of plants
- Chris Pires - Functional genomics of polyploidy
- David Schulz – Neurobiology of ion channels
- John Walker - Protein kinases in plant development

**Department of Molecular Microbiology & Immunology** (mmi.missouri.edu)
- Deborah Anderson – Molecular pathogenesis of Yersinia pestis
- Donald Burke-Aguero – Aptamers as therapeutic agents against HIV
- Dongsheng Duan – Development of novel gene therapies
- Marc Johnson – Role of gag and env proteins in HIV assembly
- Chris Lorson - Novel therapies for spinal muscular atrophy
- David Pintel – Host-virus interactions using paroviruses
- Stefan Sarafianos – Development of drugs against viral polymerases
- Habib Zaghouani – Mechanisms of autoimmune diseases

**MU Informatics Institute** (muii.missouri.edu)
- Jianlin (Jack) Cheng – Bioinformatics, computational biology
- Dmitry Korkin – Bioinformatics of protein-protein interactions
- Dong Xu – Bioinformatics, computational biology
Other Programs

Two week Biomedical Informatics Institute for Undergraduates!
MU’s Howard Hughes Medical Institute C3 Program will offer a two-week undergraduate Biomedical Informatics Institute at the University of Missouri May 19-30, 2014. The institute is open to undergraduate students interested in biological and/or computer sciences. Examples of topics/activities include: introduction to bioinformatics; introduction to phenotypes and genotypes; NCBI resources and databases; biological sequence search and alignment tools; protein structure prediction; protein alignment/fold analysis; core research facilities tour; introduction to medical informatics; translational biomedical informatics; and group research projects. Participating students will receive free room and board. Students are not required to participate in summer research at MU.

Additional information (including pre-requisites) and application materials will be made available at hhmi.missouri.edu

Summer Research Internship in Medical Sciences
The Office of Research at the University of Missouri School of Medicine coordinates a summer research program for undergraduates enrolled at other institutions. The objective of the program is to recruit underrepresented racial and ethnic groups to the medical school with the goal of improving diversity and inclusion in the clinical medicine workforce. Application deadline is February 14, 2014.

Additional information (including pre-requisites) and application materials will be made available at medicine.missouri.edu/internship/

Summer Programs Pending Funding!
The University of Missouri is awaiting word from the National Science Foundation on these programs for Summer 2014:

Computational Neurosciences
Biomaterials & Condensed Matter (Physics)
Biocomplexity and High Performance Computing

If you are interested in these programs, please check our website (listed below) for updated information after February 8, 2014. Applications will be due later in the spring. You may also contact Pam Cooper (CooperPJ@missouri.edu) to be put on a mailing list to receive information once we have learned about our level of grant funding for this program.

undergradresearch.missouri.edu/programs-jobs/programs

Examples of speakers and topics from our past summer programs:
Dr. Joel Maruniak (Biological Sciences) Finding your right livelihood
Dr. Linda Blockus (Undergraduate Research) Writing Effective Personal Statements
Dr. Pam Hinton (Nutritional Sciences) Determinants of Bone Health
Dr. Dennis Lubahn (Biochemistry and Animal Sciences) How wanting to live forever leads to one-eyed sheep and prostate cancer
Bill Allen (Journalism) A Career of Science Writing
Dr. Michael Garcia (Biological Sciences) Insulin and your nerves: Myelin to multiple sclerosis
Dr. Angela Speck (Astronomy) & Dr. Alan Whittington (Geological Sciences) Balancing Academic Science Careers and Family Life
Brandon Blakey (Applied Biosystems Genomic Analysis Division & 1992 Summer Intern) This is My Life: Industry Sales, Service & Consulting
Dr. Ray Semlitsch (Biological Sciences) The graduate application process
Dr. Jack Schultz (Bond Life Sciences Center) Talking science to the public: Why don’t they listen?
Dr. Sherry Flint-Garcia (USDA) Using sequence diversity to understand agronomic traits
Dr. Marc Johnson (Molecular Microbiology & Immunology) How do viruses put themselves together?
Dr. Fred vom Saal (Biological Sciences) Plastics-based endocrine disrupters and your health
Dr. Salman Hyder (Veterinary Biomedical Sciences) Tumor Angiogenesis: A Target for Treatment and Prevention of Breast Cancer
Dr. Mannie Liscum (Biological Sciences) Plants do cool things too: Molecular genetics and cell biology of photopism
Dr. Casey Holliday (Pathology & Anatomical Sciences) 21st Century Paleontology: Functional morphology and evolution of the reptile head
Dr. Jon Dyer (Dermatology & MU Intern) You’re a pediatric what?!? Pediatric dermatology clinical research
Dr. Gary Stacey (Plant Sciences) The Importance of Public Policy to your Scientific Career
Dr. Stephanie McKay (Animal Sciences) Bovine Genome: Development of the first generation bovine haplotype map